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<p>(54) Title: DRINKING STRAW HAVING A FLAVOR AGENT COATING</p> <p>(57) Abstract</p> <p>The invention provides a straw having a flavor-producing coating (20) on its outer surface (14). The straw acts to flavor liquids and can substitute or compliment existing garnishes, thus enhancing the flavor and enjoyment of various mixed beverages. When the straw is used as a drinking straw, the carrier adhesive melts, releasing flavor agent particles into direct contact with the consumer's tongue stimulating the taste buds. When the straw is used as a stirrer in liquids, the carrier adhesive melts releasing flavor agent particles, thus imparting flavoring to the liquid.</p>		

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DRINKING STRAW HAVING A FLAVOR AGENT COATING

This application claims the benefit, under 35 U.S.C. §119(e), of U.S. Provisional Application Serial No. 60/057,698, filed August, 27 1997, the entire contents of which
5 are incorporated herein by reference.

TECHNICAL FIELD OF INVENTION

The invention relates to a straw having a flavor-producing particulate coating containing a flavoring agent on its outer surface, and to a method for producing such a straw. The straw can be used to flavor the mouth as liquids are consumed through the
10 straw, and to flavor liquids being stirred with the straw.

BACKGROUND

Previously described flavor-producing drinking straws provide flavor agents on the inner surface of the straw so that the flavor agent is greatly diluted as it is assimilated into the beverage passing upwardly through the straw. The greatly diluted flavor
15 agent has a reduced effect on the taste buds of the consumer's tongue, such that the consumer experiences only a minimal sensation of the flavor agent. See U.S. Patent Nos. 4,921,713 (Fowler), 5,094,861 (D'Auguste) and 3,615,595 (Guttag). Other strategies for using a straw or stirrer to flavor beverages are described in U.S. Patent Nos. 3,545,980 (Stanger) and 3,824,322 (Fiorella), which offer limited flavoring
20 options and pose difficulties for manufacturing, packaging and storage.

SUMMARY

The invention provides a straw comprising a straw body having an outer surface and a flavor-producing particulate coating adhered to the outer surface. In one embodiment, the flavor producing coating comprises a meltable carrier adhesive and a powdery granular flavor agent. In a further embodiment, the flavor producing coating additionally comprises an encapsulating agent. The invention also provides a method for producing a straw having a flavor-producing coating. The method comprises obtaining a straw having an outer surface, applying a meltable carrier adhesive to the outer surface of the straw, applying a powdery granular flavor agent to outer surface
25 of the straw, and, optionally, applying an encapsulating agent to the outer surface.
30

In one embodiment, the straw body comprises a hollow tube. The straw can be, for example, a drinking straw or a stirrer. In some embodiments, the straw is used in conjunction with cold beverages, such as alcoholic beverages. Examples of alcoholic beverages include, but are not limited to, margaritas and daiquiris. For use as a stirrer, 5 for example, the straw need not be a hollow tube. In some embodiments, the stirrer is used to flavor hot beverages, such as coffee, tea or hot chocolate. In some embodiments, the flavor-producing coating is adhered proximate to an end of the straw, such as for approximately 20 to approximately 45 percent of the body length.

Examples of meltable carrier adhesives for use in producing the straw include, but are 10 not limited to, valerolactic acid, cinnamyl alcohol, magnesium chlorate, wax, corn syrup, hydrogenated starch, hydrolysate, hydro methoxyl pectin, hydrolyzed protein, modified starch, pregelatinized starch, sorbitol, sucrose, carboxymethylcellulose, carboxyethylcellulose, dextrose, fructose, maltose, isomalt or manitol. The adhesive can be selected to have a desired melting point, depending on the intended use, for 15 example, with hot or cold beverages. In one embodiment, the meltable carrier adhesive has a melting point of about 70 to about 98 degrees Fahrenheit. In another embodiment, the meltable carrier adhesive has a melting point of about 30 to about 70 degrees Fahrenheit.

In some embodiments, the powdery granular flavor agent is a solid substance having a 20 particle size of approximately 1 to approximately 50 microns, preferably a size of approximately 10 to approximately 20 microns. Examples of powdery flavor agents include, but are not limited to, flavors selected from the group consisting of fruit, nut, coffee, chocolate, vanilla, cinnamon, nutmeg, and mint. In one embodiment, the powdery flavor agent comprises a citrus flavoring, such as lime or lemon. In a 25 preferred embodiment, the powdery flavor agent comprises a mixture of citrus flavor, sweetener and salt. In another embodiment, the powdery granular flavor agent comprises citric acid.

BRIEF DESCRIPTION OF THE FIGURE

The single figure is a view of a drinking straw/sipping stirrer having a flavor-producing particulate coating 20 on the outer surface 14. 30

DETAILED DESCRIPTION

- The invention provides a straw having a flavor-producing particulate coating containing a flavoring agent on its outer surface. In preferred embodiments, the coating is proximate to an end of the straw. For example, the flavored coating can be 5 on an end that is to be inserted into a person's mouth, and/or on an end to be inserted into the beverage for stirring. The straw can be used as a drinking straw to flavor liquids which are drawn through it, or as a stirrer to flavor liquids directly. The invention also provides methods for producing a straw having a flavor-producing particulate coating.
- 10 The straw can be designed to achieve control and versatility of flavoring through the use of various sizes and treatments of flavor-producing particles, through the selection of adhesive by which the coating is adhered to the straw, and through encapsulation of the adhered particles. The controlled release properties of the flavor-producing particulate coating can be optimized for use with either hot or cold beverages, or, in 15 another embodiment, to allow for use of a flavoring that may not be tolerable in direct contact with the mouth, but is encapsulated so that the flavoring can be dissolved when stirred into the beverage, but will not dissolve in the mouth during consumption. By way of example, these parameters of the coating can also be varied to extend the duration of flavoring, to extend one flavor presented in conjunction with another 20 flavor (e.g., lemon flavoring encapsulated in a lime-flavored starch), and to extend the shelf life of the coating.
- 25 The straw provides a flavor-producing coating on its exterior, which is visible to the user and provides a natural and pleasing appearance. In addition, because the coating can be applied to conventional drinking straws, the invention provides a flavored drinking straw that is easy to manufacture, package and store.
- When used as a straw to draw liquid upwardly through the straw into the mouth, some 30 of the flavor agent which contacts the mouth is assimilated into the liquid so as to stimulate the taste buds. The flavor agent can be concentrated on the straw so that the maximum effect of the flavor agent is experienced by the person consuming the liquid. The flavor coating can be heat/saliva-activated by the person's tongue, so that the flavor agent is liquefied by human saliva for direct contact with the tongue surface in a relatively concentrated solution. The consumer experiences a sensation that the beverage being consumed has the strong flavor associated with the flavor agent.

The invention can be used with various beverages and flavoring agents. However, a preferred use of the invention is to enhance the flavor of alcoholic beverages, such as margaritas, daiquiris and various mixed drinks. The flavoring agent is preferably a powdery, fine granular material comprising a mixture of lime, salt, sugar and/or other citric flavors. Preferably the powdery mixture is contained in a carrier material as a homogeneous coating on the outer surface of the drinking straw. In one embodiment, the carrier material is a heat-responsive material that transitions from solid state to a liquid state at a temperature near the temperature of a person's tongue, i.e. approximately 80 to 90 degrees Fahrenheit. In another embodiment, the carrier material is selected so as to more readily dissolve in a highly aqueous solution, so as to more effectively flavor the beverage. In some embodiments, a combination of carrier materials is used to optimize performance for both hot and cold beverages.

As a person uses the externally coated drinking straw to draw the alcoholic beverage into his or her mouth, the coating in contact with the person's tongue is liquefied by the relatively high temperature and presence of amylase on the tongue surface. The powdery flavoring agent is further released with saliva, enzymes and the carrier material so as to be in a relatively concentrated condition on the tongue surface. A minor percentage of the flowing beverage may intermix with the flavoring agent, but without significantly diluting the effect on the taste buds of the consumer's tongue.

- 20 The person consuming the beverage has the sensation that the flavoring agent is a component of the beverage, even though the beverage is mainly a separate stream distinct from the flavor agent in contact with the consumer's tongue. The invention maximizes the effect of the flavoring agent on the taste buds by maintaining separation between the flavoring agent and the beverage.
- 25 The straw can be inverted so that the coating is in contact with the beverage. The straw can subsequently be inverted again without losing the flavoring effect. Alternatively, the inverted straw can be used to allow the flavoring to slowly dissolve into the beverage. The straw in this inverted position can be used as a stirrer, so that more flavoring is dissolved into the beverage with longer and/or more vigorous stirring. Highly concentrated encapsulated flavors can be selected to maximize effect on the beverage with a minimal amount of particles.

Structure of Straw with a Flavor-Producing Particulate Coating on its Outer Surface

The invention provides a straw having a flavor-producing particulate coating containing a flavoring agent on its outer surface. In a preferred embodiment, the coating is proximate to an end. The drawing shows a straw that comprises a tubular straw body 10. In one embodiment, the straw comprises a material resistant to destruction by liquid beverages, including, but not limited to, plastic or wax coated paper. An example of a plastic that can be used is polypropylene. Alternatively, polyethylene or materials known in the art can be used. The straw to be coated can be a commercially available straw (e.g., obtainable from Zoo Piks International, Dallas, TX), or constructed by means well known in the art. The straw can range in length and diameter, for example, from a small sipping stirrer to a giant drinking straw. The straw can range in shape. For example, the straw can be straight, or contain bends and loops. Creatively shaped straws can be designed for appeal to children.

In one embodiment, the straw is a hollow tube. In another embodiment, the straw is solid or closed at one or both ends, such that the coating can be used to flavor and stir a beverage. In a preferred embodiment, the straw body is a tube having an inner surface 12 and an outer surface 14. In a preferred embodiment, the inner surface 12 is clean and untreated for passage of a liquid upwardly through the straw body. In use of the straw for drinking, the lower end 16 of the straw body is inserted into a liquid, and the upper end 18 of the straw body 10 is inserted into the mouth and suction applied to draw the liquid beverage into the mouth. The outer surface 14 of the straw body has a flavor-producing particulate coating 20 thereon, proximate to the upper end 18 of the straw body 10. Preferably, the flavor-producing coating 20 covers the circumference of the straw body outer surface 14. In some embodiments, the flavor-producing particulate coating is adhered to approximately 10-50% of the tubular body length. In other embodiments the flavor producing particulate coating is adhered to approximately 20-45%, preferably about 25-40%, most preferably about 30%, of the upper end 18 of the tubular body length.

In one embodiment, the straw body is labeled with alcohol insoluble ink. The label can be text or graphics and used, for example, to identify a commercial supplier, to enhance the appeal of the straw or for other advertising purposes.

Composition of the Flavor-Producing Particulate Coating

In a preferred embodiment, the coating 20 on the outer surface of the straw comprises a: (1) meltable carrier adhesive, which can function as an adhesive between the outer straw body and the particulate coating; (2) a powdery granular flavor agent which imparts flavor to the coating, and, optionally, (3) an encapsulating agent, which can serve to preserve the flavor agent.

The meltable carrier adhesive of the flavor-producing coating can be any non-toxic solid material. In one embodiment, the material has a melting temperature of approximately 70 to approximately 98°F. In a further embodiment, the material has a melting temperature of approximately 87 to approximately 97°F. Examples of meltable carrier adhesives include, but are not limited to, valerolactic acid (melting temperature of about 87°F), cinnamyl alcohol (melting temperature of about 91°F), magnesium chlorate (melting temperature of about 95°F), and wax mixtures blended together to have an appropriate melting temperature. In some embodiments, the adhesive is selected to be rapidly soluble in a highly aqueous solution. In one embodiment, the material has a melting temperature of approximately 33 to approximately 70°F. The composition of the meltable carrier adhesive can be selected so that the temperature sensitivity is appropriate for the temperature of the liquid with which it will be used, or for use with a range of temperatures. In one embodiment, the meltable carrier adhesive is water soluble.

By way of example, an adhesive can be selected to be applied at room temperature in a molten state through the use of one or more solvents for the purpose of adhering blends of one or more flavor particles, encapsulated flavors, or a combination thereof, which are embedded in and/or adhered to the adhesive to achieve the desired flavoring effect. Examples of adhesives include, but are not limited to, corn syrups of different types of DE, hydrogenated starch or hydrogenated starch hydrolysates, hydromethoxyl pectin, hydrolyzed proteins, modified starches, pregelatinized starches, sorbitol, sucrose, carboxymethylcellulose, carboxyethylcellulose, dextrose, sucrose, fructose, maltose, isomalt, manitol and sucralose.

Different particle sizes may be selected for use in the coating. For example, particle size can range from approximately 1 micron to approximately 50 microns, or, in another embodiment, from approximately 10 microns to approximately 20 microns. The small particle size contributes to an enhanced flavoring effect on the taste bud. In

one embodiment, the powdery granular flavor agent of the flavor-producing coating is crystallized sucrose encapsulated with flavor. Examples of carriers for encapsulating particulate flavoring agents include, but are not limited to, silica gel, sucrose, dextrose, maltodextrin and hydrolyzed proteins.

- 5 Although the invention can be used with different hot or cold liquid beverages, preferred uses of the invention include use with coffee or tea, or with alcoholic beverages. Examples of cold beverages for use with the invention include, but are not limited to, tequila, used for margaritas and daiquiris, with mixed drinks or sodas (e.g., coke and lime) or with beer. When used in a preferred embodiment, the flavoring agent is a mixture comprising one or any combination of citrus flavor, sweetener and salt. The citrus flavor used may be lemon or lime, for example.
- 10

Various flavoring agents can be used, depending on the liquid beverage being consumed. A variety of flavoring agents, including, but not limited to fruit, nut or other flavorings can be used to flavor hot or cool beverages. Fruit flavors can include but are not limited to, cherry, strawberry, blueberry, grape, orange, pineapple, banana, watermelon, peach, and currant. Nut flavors can include, but are not limited to, almond, hazelnut, macadamia, pecan, walnut, and peanut. Additional flavors include, but are not limited to, coffee, chocolate, vanilla, cinnamon, nutmeg, licorice, and clove. In some embodiments the flavor agent can comprise a sweetener, including but not limited to, sugar, honey and aspartame. In some embodiments the flavoring agent can comprise salt.

An encapsulating agent can be used in the flavor-producing coating to preserve the flavor agent, allow an unpalatable agent to be swallowed without making contact with taste buds, provide for sustained release, and/or extend the shelf life of the straw. The encapsulating agent can comprise, but is not limited to, a flavorless and colorless modified or unmodified starch. In one embodiment, the encapsulating agent is a hydrogenated starch, such as, for example, PURE-COTE (FFS, Newark, NJ). In another embodiment, the encapsulating agent is flavored and encapsulates a carrier, such as silica gel, sucrose, dextrose, maltodextrin, or a hydrolyzed protein.

- 25
- 30
- Method for Producing Straw with Flavor-Producing Coating**

The invention provides a method for producing a straw with a flavor-producing particulate coating uniformly adhered to the circumference and along all or a portion of the straw body. The powdery granular flavor agent is adhered to the carrier

adhesive using techniques so as to form a homogeneous coating on the meltable carrier adhesive. The thickness of the coating can be selected to allow for packaging of the produced straws for commercial use, and also to optimize attractiveness of the straw's final appearance to the consumer. In one embodiment, the coating is less than 5 about one-tenth of an inch thick. Preferably, the coating is about 3 to about 20 particles in thickness, and more preferably, about 8 to about 12 particles in thickness. In one embodiment, the thickness of the coating is about 50 to about 300 microns. In a preferred embodiment, the coating is about 200 microns thick.

In one embodiment, the method comprises coating the desired length of the straw with 10 the meltable carrier adhesive. In one embodiment, straws are evenly coated with a meltable carrier adhesive on the outer surface by passing them through calibrated rotating fluid dispersion pads which spread the meltable carrier adhesive on the straw outer surface. The meltable carrier adhesive is preferably solid at room temperature, but melted to approximately 150°F to ensure that the carrier is at an optimum viscosity 15 level for spreading readily adheres to the straw outer surface and also ensures maximum adherence by the flavor agent. In some embodiments, the adhesive is sprayed onto the straw through heated, low viscosity precision fluid nozzles.

The method further comprises coating a desired portion of the straw with the powdery granular flavor agent particles. After the straw has been covered with carrier adhesive, 20 the straw can be covered with flavor agent particles. In one embodiment, the flavor particles are introduced to the meltable carrier adhesive by passing straws through a turbulence tunnel in which the flavor agent particles are sprayed onto the straw using a continuous high-velocity particle spray and air knives. The flavor agent is preferably in a finely divided condition wherein the size of individual particles is on 25 the order of microns. In other embodiments, the powdery granular flavor agent is applied by continuous curtain flow of particles.

The preferable result of this process is a uniform coating of dry flavored crystals firmly embedded in and/or adhered to the carrier adhesive on the straw surface. In a variation of this method, the flavor agent particles can be applied to the carrier 30 adhesive in a lumpier fashion to alter the flavoring effect. The thickness of the layer of flavoring agent particles coating the straw can be selected to alter the duration of time the flavoring agent will remain on the straw. Preferably, sufficient coating is applied so that the flavoring continues to be released for the duration of the drinking operation. In an alternative embodiment, the meltable carrier adhesive and flavoring

agent particles may be combined prior to application to the body of the straw, and this combination of ingredients applied to the straw outer surface simultaneously.

The method for the production of the straw further comprises coating the desired length of the straw with the encapsulating agent. In one embodiment, the

- 5 encapsulation agent can be applied over meltable carrier adhesive and flavor agent particles by passing the straw through a continuous flow of quick-drying spray of a flavorless, colorless modified or unmodified starch. In one embodiment, the encapsulation material is a hydrogenated starch.

Use of the Straw with Flavor-Producing Coating

- 10 When a person uses the straw as a drinking straw by holding the upper end 18 of the straw body 10 in the mouth, the portion of coating 20 in contact with the person's mouth is liquefied (by exposure to the elevated temperatures and saliva inside the mouth), and the micron-sized flavor agent particles in the coating are released from the carrier adhesive. Taste buds in the person's tongue are stimulated by the relatively 15 concentrated flavoring agent. During the beverage-consuming operation, some of the liquid coming from the straw body into the person's mouth may come into contact with the flavor agent particles. However, the liquid is primarily separated from the flavor-producing particles, due to the fact that the liquid beverage is flowing out of the interior space within the straw body, whereas the flavor-producing particles are 20 located on the exterior surface of the straw body. Thus, the liquid has a minimal diluting effect on the flavor-producing particles.

When the person does not desire the flavoring, the straw can be used as a stirrer by immersing the upper end 18 of the straw body 10 into the liquid. The flavored coating is typically insoluble in cool liquid (due to the relatively high melting temperature of 25 the carrier adhesive), thereby preventing release of the flavoring into the cool beverage. However, in hot liquids, the meltable carrier can melt and the flavoring agent is imparted into the beverage by manual control stirring. In other embodiments, the particles are adhered using a carrier and/or encapsulation adapted for use in a highly aqueous solution, allowing for ready dissolution upon stirring.

- 30 An advantage of the invention is the elimination of need for a garnish to accompany a beverage. For example, a lime wedge can spoil and serve as a vehicle for transmission of infection to the person drinking the beverage it is garnishing. Therefore, the straw

provides the flavoring of the garnish without the risks associated with perishable sources of flavoring.

- In one embodiment, the straw is used for oral delivery of a therapeutic or prophylactic agent. A therapeutic agent, such as a medication, or a prophylactic agent can be 5 included in the coating. Examples of prophylactic agents include, but are not limited to, vaccines, vitamins and minerals.

The above descriptions illustrate features and materials that can be used in practice of the invention. However, it will be appreciated that the descriptions are illustrative, and that other materials and material combinations can be used.

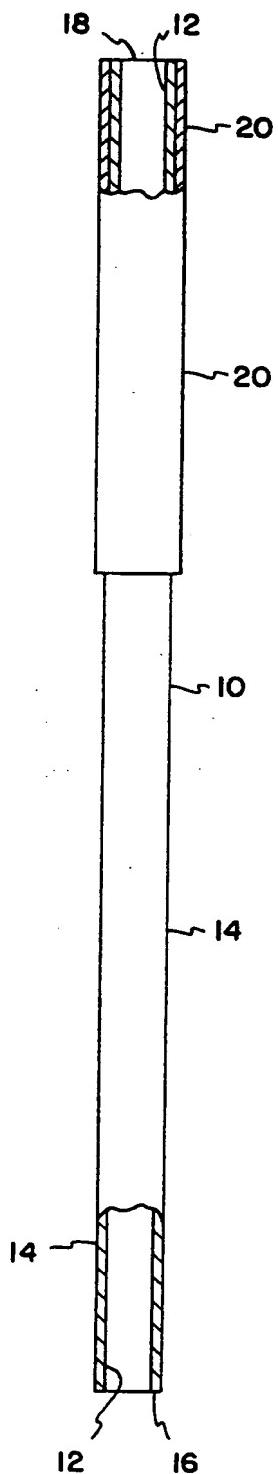
What is claimed is:

1. A straw comprising a straw body having an outer surface and a flavor-producing particulate coating adhered to the outer surface.
- 5 2. The straw of claim 1, wherein the flavor producing coating comprises a meltable carrier adhesive and a powdery granular flavor agent.
3. The straw of claim 1 or 2, wherein the flavor producing coating further comprises an encapsulating agent.
4. A method for producing a straw having a flavor-producing coating
10 comprising:
 - (a) obtaining a straw having an outer surface;
 - (b) applying a meltable carrier adhesive to the outer surface of the straw; and
 - (c) applying a powdery granular flavor agent to outer surface of the straw.
- 15 5. The method of claim 4, further comprising applying an encapsulating agent to the outer surface.
6. The straw or method of any one of claims 1-5, wherein the straw body comprises a hollow tube.
7. The straw or method of any one of claims 1-6, wherein the straw comprises a
20 drinking straw.
8. The straw or method of any one of claims 1-7, wherein the straw comprises a stirrer.
9. The straw or method of any one of claims 1-8, wherein the flavor-producing coating is adhered proximate to an end of the straw.
- 25 10. The straw or method of any one of claims 1-9, wherein the flavor-producing coating is adhered along the straw body for approximately 20 to approximately 45 percent of the body length.

11. The straw or method of any one of claims 1-10, wherein the flavor-producing coating is less than about one-tenth of an inch thick.
12. The straw or method of any one of claims 1-11, wherein the straw body is labeled with alcohol insoluble ink.
- 5 13. The straw or method of any one of claims 2-12, wherein the meltable carrier adhesive comprises valerolactic acid, cinnamyl alcohol, magnesium chlorate, wax, corn syrup, hydrogenated starch, hydrolysate, hydro methoxyl pectin, hydrolyzed protein, modified starch, pregelatinized starch, sorbitol, sucrose, carboxymethylcellulose, carboxyethylcellulose, dextrose, fructose, maltose, isomalt or manitol.
- 10 14. The straw or method of any one of claims 2-13, wherein the meltable carrier adhesive has a melting point of about 70 to about 98 degrees Fahrenheit.
- 15 15. The straw or method of any one of claims 2-13, wherein the meltable carrier adhesive has a melting point of about 30 to about 70 degrees Fahrenheit.
- 15 16. The straw or method of any one of claims 2-15, wherein the powdery flavor agent comprises a flavoring selected from the group consisting of sweetener, salt, fruit, nut, coffee, chocolate, vanilla, cinnamon, nutmeg, licorice, clove and mint.
- 20 17. The straw or method of any one of claims 2-16, wherein the powdery granular flavor agent is a solid substance having a particle size of approximately 1 to approximately 50 microns.
18. The straw or method of any one of claims 2-17, wherein the powdery granular flavor agent is a solid substance having a particle size of approximately 10 to approximately 20 microns.
- 25 19. The straw or method of any one of claims 2-18, wherein the powdery granular flavor agent comprises citric acid.
20. The straw or method of any one of claims 2-19, wherein the powdery flavor agent comprises a citrus flavoring.

21. The straw or method of claim 20, wherein the citrus flavoring is lime or lemon.
22. The straw or method of any one of claims 2-21, wherein the powdery flavor agent comprises a mixture of citrus flavor, sweetener and salt.
- 5 23. The straw or method of any one of claims 1-22, wherein the coating further comprises a therapeutic or prophylactic agent.
24. The straw or method of claim 23, wherein the therapeutic agent is a medication.
- 10 25. The straw or method of claim 23, wherein the prophylactic agent is a vaccine, vitamin or mineral.
26. The straw or method of any one of claims 3 or 5-25, wherein the encapsulating agent is a colorless, flavorless starch.
27. The straw or method of any one of claims 2-26, wherein the powdery granular flavor agent is applied by spraying the agent onto the outer surface.
- 15 28. The straw or method of any one of claims 2-27, wherein the powdery granular flavor agent is applied by continuous curtain flow of particles.
29. The straw or method of any one of claims 2-28, wherein the meltable carrier adhesive and powdery granular flavor agent are applied simultaneously.

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FIG. 1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/17756

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
FR 1369692	A	09-12-1964	NONE		
DE 29616646	U	05-12-1996	NONE		
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US 4816268	A	28-03-1989	NONE		

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/17756

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A47G21/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A47G B65D A61J A23P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 1 369 692 A (J.P. REYNOLDS TOBACCO COMPANY) 9 December 1964 see page 1, column 2, paragraph 3 – page 4, column 2, paragraph 2; figures	1-11, 13-22, 26, 29
X	DE 296 16 646 U (KIS ERNST) 5 December 1996 see the whole document	1, 6-11, 23-25
X	US 3 252 803 A (BELASCO) 24 May 1966 see column 1, line 44 – column 2, line 58; figures ---	1, 4, 8, 9, 11, 23, 24 -/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
15 December 1998	30/12/1998
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Vistisen, L

INTERNATIONAL SEARCH REPORT

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Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 730 737 A (HARVEY R ET AL) 1 May 1973	1,3,6,7, 9-11,26
A	see column 4, line 33 - column 7, line 4; figures	19
X	US 3 717 476 A (HARVEY R) 20 February 1973	1,3,6-11
A	see column 2, line 44 - column 2, line 55; figure 5	4,5,11, 16-19
X	US 3 545 980 A (STANGER MILDRED H) 8 December 1970	1,6-11
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A	US 3 615 595 A (GUTTAG ALVIN) 26 October 1971	16-22
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A	US 4 816 268 A (TSAU JOSEF H) 28 March 1989	25
	see column 3, line 3 - column 3, line 5; figures	
